

Multimode-Optical-Fiber Imaging Probe

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ABSTRACT

Currently, endoscopic surgery uses single-mode fiber-bundles to obtain *in vivo* image information inside orifices of the body. This limits their use to the larger natural bodily orifices and to surgical procedures where there is plenty of room for manipulation. The knee joint, for example can be easily viewed with a fiber optic viewer, but joints in the finger cannot. However, there are a host of smaller orifices where fiber endoscopy would play an important role if a cost effective fiber probe were developed with small enough dimensions (≤ 250 microns). Examples of beneficiaries of micro-endoscopes are the treatment of the Eustachian tube of the middle ear, the breast ducts, tear ducts, coronary arteries, fallopian tubes, as well as the treatment of salivary duct parotid disease, and the neuro endoscopy of the ventricles and spinal canal.

To solve this problem, this work describes an approach for recovering images from tightly confined spaces using multimode fibers and analytically demonstrates that the concept is sound. The proof of concept draws upon earlier works that concentrated on image recovery after two-way transmission through a multimode fiber as well as work that demonstrated the recovery of images after one-way transmission through a multimode fiber. Both relied on generating a phase conjugated wavefront which was predistorted with the characteristics of the fiber. The described approach also relies on generating a phase conjugated wavefront, but utilizes two fibers to capture the image at some intermediate point (accessible by the fibers, but which is otherwise visually inaccessible).

NSBP-99

NATIONAL SOCIETY OF BLACK PHYSICISTS

DAY OF SCIENTIFIC LECTURES AND ANNUAL MEETING

MARCH 19 - MARCH 22, 1999

Atlanta, Georgia

REGISTRATION FORM

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Registration Fees: \$90 before March 8; \$100 thereafter \$ 90
(Includes the reception on Friday evening, the luncheons on
Saturday and Sunday, coffee breaks, and conference materials)

Banquet: \$
(I need tickets @ \$35.00 each)

NSBP Dues: \$45.00 Regular \$15.00 Student \$
\$45.00 Associate \$100 Institutional \$2500 Corporate

Total Enclosed \$ 90

Mail completed registration form and check (payable to NSBP - Clark Atlanta University) before
March 8, 1999 to:

NSBP-99
c/o Prof. Lonzy J. Lewis
Dept. of Physics - MD 102
Clark Atlanta University - PO Box 124
Atlanta, GA 30314
404-880-8797, -6258(fax), llewis@cau.edu

CALL FOR PAPERS

NSBP-99

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You are invited to submit a proposal for a paper presentation. Presentations will center on original research and issues in any area of Physics or a closely related discipline.

Two Formats

Papers: Presenters will be allotted a 20 minutes oral presentation.

Poster Sessions: Presenters will display their works graphically and answer questions.

Procedure For Submitting A Paper Proposal:

Submit the following:

- * Title of Presentation and Format Type
- * Information on the Presenter(s)--full name, highest academic degree, job title, place and address of employment or study, work and home telephone numbers.
- * An Extended Abstract not exceeding 1,000 words describing the presentation.

<p><u>Abstract Deadline: March 1,1999</u></p>

Send To:
NSBP-99 Program Committee
C/O Dr. Lonzy J. Lewis
Department of Physics
Clark Atlanta University
PO Box 124
Atlanta, GA 30314
404-880-8797, -6258(fax), llewis@cau.edu

NSBP-99
National Society of Black Physicists
Day of Scientific Lectures and Annual Meeting
March 19 - 22, 1999
Atlanta, GA

GENERAL INFORMATION: Clark Atlanta University will host the XXVI Day of Scientific Lectures and the 1999 Annual Meeting of the National Society of Black Physicists, March 19 - 22, 1999 in Atlanta, Georgia. The affair will start with a welcoming reception at 6:00 PM on Friday, March 19. Full day sessions will occur on Saturday, March 20 and Sunday, March 21. The conference will consist of both invited and contributed papers with a large percentage of invited talks for this special occasion. The traditional banquet will be held Saturday evening at the conference hotel. A special treat at NSBP-99 will be the unveiling and viewing of an Exhibit on the Contributions of African Americans to Physics featuring many NSBP members and which was conceived and produced by NSBP on Sunday. The conference will conclude after the Sunday sessions. Those familiar with NSBP meeting will notice a departure from the traditional TH - SAT format. This change in scheduling has been undertaken to allow overlap with the APS Centennial Meeting which will be held March 20 -26, 1999. We are strongly encouraging all participants to plan to stay through at least midday on Monday, March 22, and participate in at least one session of this historic event.

ACCOMMODATIONS: The official host hotel is the Crowne Plaza Atlanta Airport in Atlanta [(800) 241-4800 or (404) 768-6660], 1325 Virginia Avenue, Atlanta, GA 30344. A block of rooms has been reserved at the special rate of \$79.00 + tax. To qualify for the special rate, mention NSBP when you call and make your reservations by March 1, 1999. Hotel space is difficult to obtain in Atlanta so be sure to adhere to the deadline.

TRAVEL ARRANGEMENTS: Atlanta is served by the Atlanta Hartsfield International Airport which is located about one mile south of the host hotel and about 7 miles south of downtown and the AUC campuses. The Crowne Plaza offers a complimentary shuttle to and from the airport and to the Metro Atlanta Rapid Transit Authority (MARTA) rail station. Local taxi service is also available and convenient. Parking is complimentary at the hotel.

REGISTRATION: The registration fee for the meeting is \$90.00 if paid by March 8, 1999, \$100.00 thereafter and on-site. The registration fee will cover the opening reception, luncheons on Saturday and Sunday, coffee breaks, and conference materials. An additional \$35.00 will be charged for each Banquet ticket. To register for the conference, please complete the registration form and return to the organizing committee.

FINANCIAL SUPPORT: Limited funds are available to support student attendance at the meeting. These funds will be allocated on a first come first serve basis. It is our goal to support as many different institutions as possible; hence, the number of students supported from one institution will be limited.. Car pooling and the use of vans is encouraged for people within convenient driving distance. Partial support from the institution will allow us to support a greater number of students from a particular institution and more students in general. Further information on procedures and the application process may be obtained by contacting Dr. Lonzy J. Lewis at 404-880-8797, -6258 (fax), or llewis@cau.edu (email).

CALL FOR PARTICIPATION: .If you wish to make a presentation, respond to the call for papers in the appropriate format. Send all materials to NSBP-99 Conference Committee, c/o Dr. Lonzy J. Lewis, Department of Physics - MD102, Clark Atlanta University - POB 124, Atlanta, GA 30314; 404-880-8797, -6258 (fax), or llewis@cau.edu (email).

Signed // Dr. Lonzy J. Lewis, NSBP-99 Conference Committee Chair & Associate Professor of Physics